



State of Utah
DEPARTMENT OF NATURAL RESOURCES
DIVISION OF OIL, GAS AND MINING

Michael O. Leavitt
Governor

Robert L. Morgan
Executive Director

Lowell P. Braxton
Division Director

1594 West North Temple, Suite 1210
PO Box 145801
Salt Lake City, Utah 84114-5801
(801) 538-5340 telephone
(801) 359-3940 fax
(801) 538-7223 TTY
www.nr.utah.gov

March 19, 2003

Ms. Paula Doughty
Director, Environmental Affairs
Kennecott Utah Copper Corporation
8315 West 3595 South
P.O. Box 6001
Magna, Utah 84044-6001

Re: Review of Revised Mine Closure & Reclamation Plan, Kennecott Utah Copper Corporation ("KUCC"), Bingham Canyon Mine, M/035/002, Salt Lake County, Utah

Dear Ms. Doughty:

The Division of Oil, Gas & Mining ("DOGM"), has completed its review of your latest revised Bingham Canyon Mine - 2003 Reclamation and Water Management Plan, received January 31, 2003. After reviewing the latest information, we have prepared the attached comments that will need to be addressed before we can proceed to grant and publish tentative approval of the revised mine plan proposal. The Division's comments follow the format of KUCC's plan. If possible, please provide a response to our review by April 21, 2003.

The Division will suspend further review of the Bingham Canyon Mine revised closure and reclamation plan until your response to this letter is received. If you have any questions in this regard please contact me, Lynn Kunzler, Tom Munson, Paul Baker or Doug Jensen of the Minerals Staff. If you wish to arrange a meeting to sit down and discuss these reviews, please contact us at your earliest convenience. Thank you and your staff for your continued cooperation and professionalism as we work together to complete the refinement of this plan.

Sincerely,

D. Wayne Hedberg
Permit Supervisor
Minerals Regulatory Program

jb

Attachment: Reclamation Plan Review

cc: Dennis Frederick, DWQ
Douglas Bacon, DERR
Mary Ann Wright, DOGM

O:\M035-Salt Lake\M0350002-BinghamPit\final\KUCC-3rdrev-mine&watermanage.doc

DOGM REVIEW COMMENTS
KUCC'S BINGHAM CANYON MINE 2003 RECLAMATION & WATER
MANAGEMENT PLAN
DOGM Review Comments
(March 19, 2003)

Page 14 – last paragraph

This paragraph states that as an amendment KUC would consider the use of “pure biosolids”.
Please clarify what constitutes a pure biosolid. (DJ)

Page 28 – Section 3.4 – second paragraph

“Shaft, adit and tunnel portals within the pit area will be sealed or gated.”

The closure or guarding of all shafts, adits or tunnel portals within the mine permit area should be considered. (DJ)

Page 29 – 3rd paragraph

The plan states that if a pit lake is allowed to form, lime or another neutralizing agent will be added if required in order to maintain a circumneutral pH and minimize metals solubility during flooding.

It has been documented that pit lakes are normally strongly stratified due to elevated temperatures and low conductivity of surface waters. How will KUC assure the neutralizing agents will be thoroughly mixed? The addition of Hydroxide sludge has been documented to sink rapidly to the lake bottom leading to elevated levels of dissolved oxygen and total metals. (DJ)

Page 39 – first bulleted item

Ensure that catastrophic events cannot compromise the water collection systems for transporting contaminated water and sediment off KUCC property.

Page 38 – first paragraph

Precipitation greater than the 25 year, 24 hour storm event (the minimum system requirements specified by the storm water regulations) that falls on the slopes may also exceed the capacity of some down gradient water and sediment collection systems.

How can KUC ensure that catastrophic events will not compromise the water collection systems when they admit that the event is a possibility? (DJ)

Page 44 - Section 4.4.4

The plan states that KUC is presently completing a slope stabilization study on 200 acres of dumps that have angle of repose slopes that range from 700 to 900 feet.

If the reduction of these slope angles proves feasible, the studies should be applied to the ~1200-foot angle of repose slopes that face the Salt Lake Valley. KUC should undertake studies of these features to assess the practicality of long-term stabilization. The Division is concerned with the safety and stability of these dump slopes. The 1976 approved plan states that dumps will be left “safe and stable;” KUC has not demonstrated any long term stability of these features. (DJ)

Page 46 – Section 4.4.5

“Cross-ripping will be shallow enough to avoid mixing waste rock into cap material.”

To insure the stability of the cap material, some roughening of the waste rock should be performed before the placement of the cap material. Because recontoured slopes will form a slip plane between the waste rock and the overlying cap material that could result in slumping of the cap material during storm events. (DJ)

Page 48 – Second paragraph

None of these slopes pose a significant risk of contaminant transport off the property—

On page 36—the last paragraph concerning the high dumps facing the Salt Lake Valley says,

“Precipitation greater than the 25-year, 24-hour storm event (the minimum requirements specified by the storm water regulations) that falls on the slopes may also exceed the capacity of some down gradient storm water and sediment collection systems.”

These two statements seem to contradict each other, which statement is correct? (DJ)

R647-4-113.3 Surety

In 1976, Kennecott Utah Copper Corporation proposed and entered into a Self-bonding Reclamation Contract with the Board of Oil, Gas and Mining as the form of reclamation surety for the Bingham Canyon Mine. That agreement continues to remain in effect. The original permit application contains a number of possible reclamation scenarios that might be followed depending upon the site conditions and other circumstances at closure and the advances made in reclamation technologies over the years. Very little design detail was provided in the original reclamation plan, therefore it was difficult, if not impossible, to prepare a reasonably accurate reclamation cost estimate. The Bingham Canyon Mine is the only self-bonded permit that does not have a reclamation cost estimate associated with the contract.

More recently, significant enhancements have been made to the Bingham Canyon Reclamation Plan that outline more definitive closure and reclamation design details. Accordingly, it is our opinion that a reasonable reclamation cost estimate can now be developed.

We request that KUCC prepare and submit an engineering-based reclamation cost estimate that the Division can use to generate a state-based reclamation estimate for the Bingham Canyon Mine permit. ✓

Page 58 – Second and third paragraphs

Second paragraph states that on the mass basis, it is estimated that less than 10 percent of the South Impoundment material has the potential to become acidic. The third paragraph states,

“Based upon the data collected between 1994 and 1996 and the new NAG test results, approximately 50% of the tailings exposed on the embankment surfaces have the potential to acidify over the long term.”

The total area of the impoundment is 5800 acres of which 2300 acres is embankment. If 50% of the embankment has the potential to acidify that would equate to ~20% of the total impoundment has the potential to acidify. (DJ)

Table 10-2 identifies "Summary of the Water Management Facilities that are Anticipated to be left in Place at Closure"

The table lists the anticipated structures, but does not indicate where these structures will be located and how they will be designed?" It is our opinion that the design details associated with each of the structures identified in Table 10 are a necessary part of evaluating the reclamation success of the Bingham Canyon Mine.

The Division requests a map showing the tentative location of these structures. The engineering criteria for these structures is unknown at this time but the key to approval of these structures is their stability, so any engineering criteria should be centered around a design concept using flow rates or design storms to verify designs. (TM)

We realize that some of these structures are currently in place, like the cut-off walls, collection sumps, etc. However, the majority of the post-closure water management structures are not built yet and the plan does not include a projected timeframe when these structures will be designed and submitted for our review. It is mentioned on page 64 that "tentative reclamation activities have been selected based upon the existing incomplete data set." This statement does not define what that data set is.

Please provide more detail regarding this data set and what it encompasses. (TM)

It is stated on page 65 and section 10.0, Post-Closure Water Management, that after closure the surface and groundwater flows will be captured and managed in perpetuity. This statement raises the following questions:

1. *Who will manage and maintain these post-closure water treatment structures "in perpetuity" and how will the long-term maintenance requirements for these structures be funded?*
2. *The design parameters for all structures (pipes, collection sumps, ponds and ditches, cutoff walls, horizontal drains, shallow wells, etc.) listed in Table 10 as being in place for perpetuity are not identified. We request that a schedule be submitted that will identify when Kennecott anticipates submitting the design plans for these structures to the Division.*
3. *It is appropriate for surface water diversions, ponds, etc., that will remain in place for perpetuity, to be designed for the 100 year, 24 hour storm event. Any storage impoundments with spillways should also be designed according to the same criteria. (TM)*

Wells exist throughout the property and their disposition is not clearly identified. The life of monitoring the wells could be for a short period, 30 years, in perpetuity, or some time period in between. We have not received a detailed closure plan for these wells. We request that the closure design criteria be spelled out and that the methods to close these wells comply with the State Engineer's specifications when the time comes.

This following closure information must be documented with the Division of Oil, Gas, and Mining within a year of closure of the mine.

- 1. We request that all wells within the Bingham Mine Permit boundary be grouped by ownership, monitoring criteria and by anticipated closure date.*
- 2. A detailed explanation of the well closure protocol should be included in the plan regarding all wells that are under Kennecott ownership. (TM)*

Page 14.

For areas where structures are demolished, this section says that if the existing soils or fill materials do not provide a suitable growth media, topsoil will be imported and spread to a minimum depth of six inches. Six inches of soil will not provide adequate rooting depth over unsuitable soils or fill materials. There needs to be at least 2-3 feet of growth medium for plants to become established and persist.

Therefore, the plan should be revised to indicate that in those areas where structures are demolished and where existing soils or fill material do not provide a suitable growth medium, KUCC will either import soils or amend the existing soils so there is at least 2-3 feet of rooting medium, including six inches of topsoil. (PBB)

Page 30 - This section addresses pit reclamation.

The plan says no reclamation work will be done on the benches because most are not safely accessible, and it also says seed will be broadcast except in areas where there is a nearby seed source.

Although most of the benches may not be safely accessible, those that are accessible should be ripped. The Division's experience is that natural revegetation is often very slow and may result in weed establishment. Therefore all areas where revegetation may be possible should to be seeded. (PBB)

Figures 4-4 and 4-5, page 35. and Figure 4-1.

Electrical conductivity values less than about 4 mmhos/cm are not generally limiting to growth of wildland species, but Figures 4-4 and 4-5 clearly show a marked reduction above 0.5. We are not sure if there's some kind of interaction between the EC and something else or what the problem might be, but it's unlikely the EC by itself is causing this reduction in plant growth.

Would biosolids help? Have some of the more salt tolerant species that still grow at higher elevations, like fourwing saltbush, slender wheatgrass, tall wheatgrass, or pubescent wheatgrass, been tried?

Where pH values are above 5 and EC values are between about 0.5 and 4 mmohs/cm, some plots to test revegetation methods may be appropriate. (PBB)

There are some areas shown on Figure 4-1 where it appears the pH and EC values fit the criteria for revegetation but where direct planting is not planned. The plan indicates these areas may have adverse physical characteristics and that is why they are not included in the revegetation areas.

Are there ways of remediating these physical problems? Deep ripping should take care of many of the compaction problems and may also bring up fines in areas with high percentages of gravel. Areas with high percentages of gravel might also benefit from biosolids (PBB).

It would be helpful to know why some of the areas outlined in Figure 4-1 are not included in the "green."

If possible, we request that KUCC identify compacted areas and areas of high gravel content on this map. (PBB)

Where slopes are recontoured, but not revegetated, KUCC anticipates the waste rock will weather and that vegetation will eventually become established.

KUCC needs to have a very active program to control noxious weeds so they don't spread into these areas. (PBB)

Page 57.

The acreage figures given for the South Tailings Impoundment are confusing. The plan indicates that 2000 acres are disturbed, but then goes on to describe 5800 acres of disturbance.

How much acreage is currently disturbed? Please clarify these statements. (PBB)

Pages 32 and 61.

The selenium values of 1.2 and 2.1 ppm are very high if this is hot water extractable selenium. It is assumed that it is total selenium in which case the numbers are not helpful in determining whether there could be toxicity to wildlife.

Please clarify the accuracy of these measurements. (PBB)

Page 62.

At the mine, the Division can envision salt being leached from the waste rock, but in the tailings impoundment, we see salts staying in the ponds and possibly concentrating on the surface. The plan says final reclamation may need to be delayed to allow salts to be removed by precipitation, infiltration, and runoff.

Will natural precipitation events actually remove the salts? What is KUCC's justification for this statement and how long of a delay is anticipated before reclamation is performed? (PBB)

Page 6

Kennecott Bingham Canyon Mine 2003
Reclamation & Water Management Plan
M/035/002
March 19, 2003

The plan says it may not be possible to establish vegetation on some very saline interior surfaces in which case other permanent stabilization methods may be needed. The methods mentioned are capping with a growth medium, capping with coarse material, or promoting the formation of salt crusts.

It may be possible to establish vegetation in some of these areas by using a capillary barrier (coarse material) overlain by a growth medium. (PBB)

O:\M035-Salt Lake\M0350002-BinghamPit\final\KUCC-3rdrev-mine&watermanage.doc